Hazard Elimination Project Evaluation

Project Log # 200502085

Hazard Elimination Project W-2937

Evaluation of the Turn Lane Construction at Five Existing Median Crossovers and the Closure of Four Crossovers on US 64 from SR 2945 (Old US 64) to SR 2655 (Three Sisters Rd) In Wake County

Documents Prepared By:

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_____ 5/31/2006_____
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Hazard Elimination Project Evaluation Documentation

Subject Location

Evaluation of Hazard Elimination Project W-2937 –
Crossovers on US 64 from SR 2945-Old US 64 (MP 27.59) to SR 2655-Three Sisters Road (MP 33.90)

Project Information and Background from the Project File Folder

The project contained the following crossovers and their respective safety countermeasures:

Location 1: Cal-Tone Paint, MP 27.04
Improvements DELETED from this project.

Location 2: SR 2945 (Old US 64), MP 27.59
Crossover Closed.

Location 3: SR 2217 (Old Milburnie Road), MP 28.01
WB Left Turn Lane and SB Right Turn Lane installed.

Location 4: Interstate Gas, MP 28.54
Crossover Closed.

Location 5A: Barham's Restaurant, MP 29.14
Crossover Closed.

Location 5: SR 2619 (Lynnwood Road), MP 29.41
WB Acceleration Lane installed. *(Note: This Countermeasure was not evaluated.)*

Location 6: Historic House, MP 29.58
EB and WB Left Turn Lanes installed.

Location 7: Wake Stone Quarry, MP 29.86
WB Left Turn Lane installed.

Location 8: Parkside Commons, MP 30.26
Improvements DELETED from this project.

Location 9: Square D Company, MP 32.47
Improvements DELETED from this project.

Location 10A: SR 2234-2500 (Marks Creek Road), MP 33.89
Improvements DELETED from this project. Completed under Spot Safety #05-99-243.

Location 10: Citgo Gas Station, MP 33.20
Crossover Closed.

Location 11: SR 2236 (Keiths Road), MP 33.51
WB Left Turn Lanes installed.

Location 12: SR 2655 (Three Sisters Road), MP 33.90
EB Left Turn Lane installed.

Three additional intersections were evaluated to measure any possible negative effects of the Treatment Locations. These included:

SR 2517 (Rogers Lane), MP 27.15

SR 2589 (Westover Drive), MP 28.33

SR 2516 (Hodge Road), MP 28.86

Please see the attached *Location Maps* for further detail. The Locations are separated into Section 1 and Section 2. Section 1 is located just east of Raleigh and contains Locations 1 through 8. The speed limit on this portion of US 64 is 45 mph. Section 2 is located east of Knightdale and contains Locations 9-12. The speed limit on this portion of US 64 is 55 mph. Section 1 is the more commercialized facility and contains more access points than Section 2. US 64 is a four-lane divided facility with a grass median throughout both sections.

The initial crash analysis was completed on US 64 from 0.4 miles west of SR 2205 (Trawick Road) to 0.2 miles east of SR 2655 (Three Sisters Road). The initial study time period was from March 1, 1989 through February 29, 1992. According to the initial analysis, there were 877 Total Crashes. This included 440 Rear-End crashes, 60 Run Off Road crashes, 81 Sideswipe crashes, 110 Angle crashes, 87 Left-Turn crashes, and 99 Random crashes. The project was completed on April 30, 1998 at a cost of $472,000.

Naive Before and After Analysis

After reviewing the project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 1997 through October 31, 1998. The before period consisted of reported crashes from November 1, 1994 through October 31, 1997 (3 Years) and the after period consisted of reported crashes from November 1, 1998 through October 31, 2001 (3 Years). The dates for this analysis were limited to three years in an effort to mitigate the effects of the changing environment on US 64 at the Treatment Location. Since the end of the after period, construction has begun to complete I-540 and a new signalized intersection has been installed on US 64 within Section 1.

The treatment data for all locations (with the exception of Location 3) consisted of all crashes on US 64 within 150 feet of each crossover. A 0' Y-line was used on all cross streets. For Location 3, the treatment data also included all crashes on SR 2217 (Old Milburnie Road) within 150 feet of the intersection to account for crashes involving the southbound right turn lane.

The following Tables 1 and 2 depict the Naïve Before and After Analysis for the Total Crashes and Target Crashes at all of the Treatment Locations. Table 1, on the next page, depicts the Crash Breakdown by Location. Note that the color-coding in Table 1 corresponds to the color-coding found on the attached Location Maps for Sections 1 and 2. Red denotes crossovers that were closed; Green denotes crossovers where turn lanes were added; Orange denotes locations deleted from the original project scope; and gray denotes other intersections possibly affected by the Treatment.

The Target Crashes specific to each location are also found in Table 1. The Target Crashes for closed crossovers include all Frontal Impact, Rear End, and U-turn Related Crashes. The Target Crashes for locations where turn lanes were added include Rear End-Turn Crashes. The Target Crashes for locations upstream and downstream of the closed crossovers include U-turn Related Crashes in that direction of travel. U-turn Related Crashes may include the following: Rear End Crashes in the Left Turn Lane, crashes caused by a conflict between left-turning vehicles and right-turning vehicles, or any crashes that specifically mention a U-turning vehicle in the crash report narrative.

Table 2 contains the combined crash data for all of the Treatment Locations and includes the Total and Target Severity Index. A brief summary of the Target Crashes is also included. For this analysis, the before period ADT year was 1996 and the after period ADT year was 2000.

Table 1. Crash Breakdown by Location

	Before	After	Percent Change	Target Crashes / Notes
Rogers				
Total	20	32	60.0	**May 1995 Signal*
Target	0	0	n/a	**Target: WB U-Turn Crashes**
Location 2				
Total	8	0	-100.0	
Target	5	0	-100.0	**Target: All Frontal Impact, Rear End, and U-turns**
Location 3				
Total	22	22	0.0	**Used 150' Y-Line for this Location to Include SB Crashes.*
Target	3	2	-33.3	**Target: Rear End-LT WB; Rear End SB; EB U-Turn Crashes**
Westover				
Total	7	8	14.3	
Target	0	0	n/a	**Target: WB U-Turn Crashes**
Location 4				
Total	5	0	-100.0	
Target	3	0	-100.0	**Target: All Frontal Impact, Rear End, and U-turns**
Hodge				
Total	31	21	-32.3	
Target	2	2	0.0	**Target: EB/ WB U-Turn Crashes**
Location 5A				
Total	5	0	-100.0	
Target	5	0	-100.0	**Target: All Frontal Impact, Rear End, and U-turns**
Location 5				
Total	23	27	17.4	**February 1995 Signal*
Target	0	0	n/a	**Target: EB U-Turn Crashes**
Location 6				
Total	4	0	-100.0	
Target	4	0	-100.0	**Target: Rear End-LT, Both Dir**
Location 7				
Total	4	1	-75.0	
Target	1	0	-100.0	**Target: Rear End-LT, WB Dir**
10A				
Total	22	21	-4.5	**Convertion to Directional Crossover Completed on 11/30/2001*
Target	0	0	n/a	**Target: WB U-Turn Crashes**
10				
Total	9	0	-100.0	
Target	5	0	-100.0	**Target: All Frontal Impact, Rear End, and U-turns**
11				
Total	5	8	60.0	
Target	0	1	n/a	**Target: Rear End-LT WB; EB U-Turn Crashes**
12				
Total	4	3	-25.0	
Target	0	0	n/a	**Target: Rear End-LT, EB Dir**
Total Crashes	**169**	**143**	**-15.4**	
Target Crashes	**28**	**5**	**-82.1**	

Note: Coloring coding above corresponds to the color coding on attached Location Maps.

Table 2a. Treatment Information

All Locations	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	169	143	-15.4%
Total Severity Index	7.33	7.09	-3.3%
Target Crashes	28	5	-82.1%
Target Severity Index	4.44	5.44	22.5%
Volume	47,500	52,200	9.9%

Table 2b. Target Crash Information

All Locations	Before	After	Percent Reduction (-)/ Percent Increase (+)
Fatal Injury Crashes	0	0	N/A
Non-Fatal Injury Crashes	13	3	-76.9%
Total Injury Crashes	13	3	-76.9%
Night Crashes	3	2	-33.3%
Wet Crashes	5	0	-100.0%

As shown in the previous tables, the locations analyzed experienced an overall decrease in Total Crashes of 15.4 percent and a decrease in Target Crashes of 82.1 percent. There was a 9.9 percent increase in Average Daily Traffic (ADT).

As shown in Table 1, a signal was installed at Rogers Lane and Location 5 within the before period. Because of the insufficient before period time frame, the treatment at Location 5 was not evaluated although the location was still evaluated for U-turn crashes. Take into consideration that the signalization may have an effect of the number of Total and Target Crashes at these locations.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 15.4 percent decrease in Total Crashes and an 82.1 percent decrease in Target Crashes. Further investigation shows there was a 3.3 percent decrease in the Severity Index for Total Crashes. The summary results above demonstrate that when using the naive before and after analysis method the Treatment Locations appear to have had a reduction in the frequency and severity of crashes from the before to the after period. The reduction in crashes at the Treatment Locations appears to be the result of a combination of countermeasures applied along the network, and may not be attributed to any specific countermeasure.

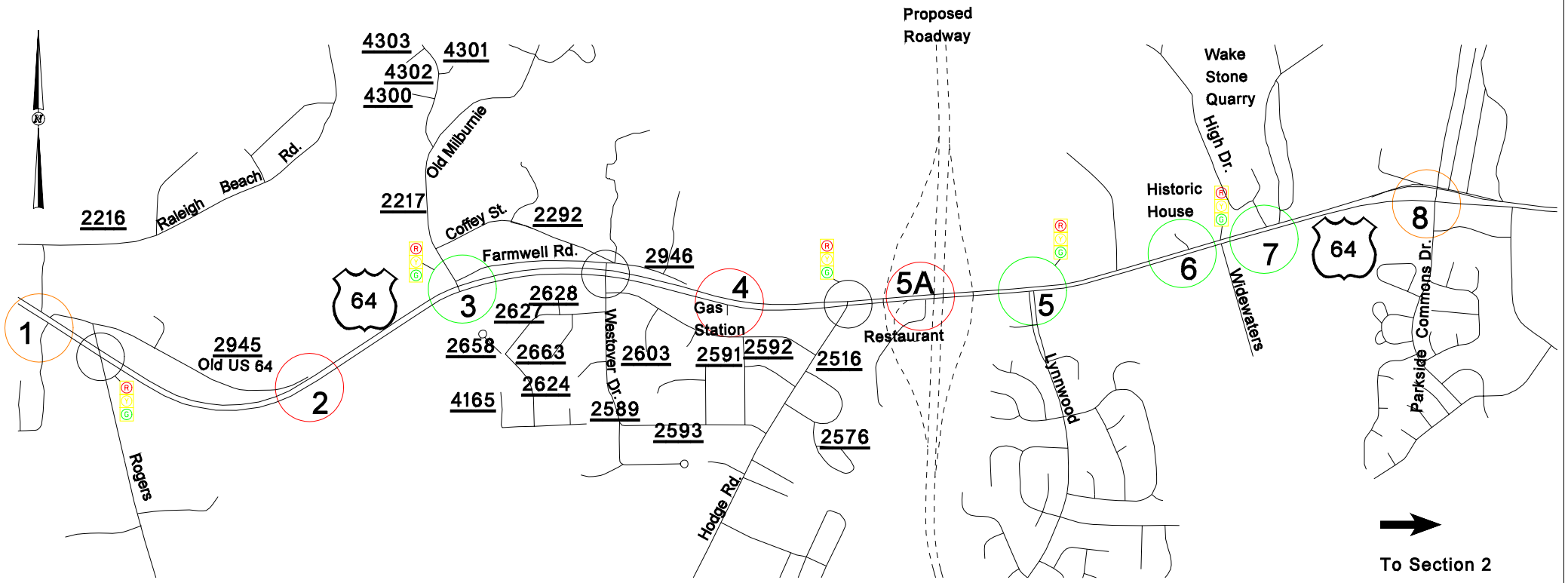
The number of Target Crashes decreased from 28 crashes in the before period to 5 crashes in the after period. Because of the combination of countermeasures used, the Target Crashes for this evaluation include a variety of crash types and vary by location. See Table 2 for a description of Target Crashes by location. At the crossovers that were closed, the number of Target Crashes decreased from 18 crashes in the before period to none in the after period. At the locations were turn lanes were installed, the number of Target Crashes decreased (by 62.5 percent) from eight crashes in the before period to three crashes in the after period.

Motorists wishing to make through and left turn movements from the side street approaches at the closed crossovers now need to find an alternative route (i.e. potential crash migration occurs). Therefore, the effect of the closed crossovers on the surrounding intersections must remain in consideration while assessing the analysis of these Treatment Intersections. The only intersection next to a closed crossover that experienced U-turn Type Crashes was Hodge Road, which had two Target Crashes in the before period and two Target Crashes in the after period. It appears that the treatment intersection has had minimal impact on the number of crashes at the surrounding U-turn locations. Please see the attached *Treatment Site Location Photos*. Photos are provided for most of the evaluated locations. Photos are not provided for Locations 4 and 5A because the businesses at these locations have been removed and the crossovers are no longer visible.

The section of US 64 being evaluated is currently experiencing many changes. As mentioned earlier, construction of the proposed I-540 Beltline is currently underway, which will cross US 64 between Hodge Road and Location 5 (Lynnwood Road). A new signalized intersection was also constructed on US 64 between Lynnwood Road and Parkside Commons Drive, at the Widewaters Commons Shopping Center. More developments are currently being constructed on the strip near the shopping center. Crossover 6, which was located just west of the Widewaters Commons Shopping Center, has been removed since the end of the After Period to accommodate the development. Please see the Location Map (Section 1) for more detail. Another recent and important change to the Treatment Location is the newly opened US 64 Bypass, which will divert away a large number of through traffic. The before and after time frames for this analysis were kept short in an attempt to negate the effect of these changes on the treatment.

Also note that Location 10A, the intersection of US 64 and SR 2500-2234 (Marks Creek Road), has previously been evaluated by the Safety Evaluation Group. This intersection was converted from a full-movement crossover to a directional crossover under Spot Safety Project #05-99-243.

Location Map for Hazard Elimination Project W-2937 (Section1)



Location 2, 4, 5A: Crossover Closed

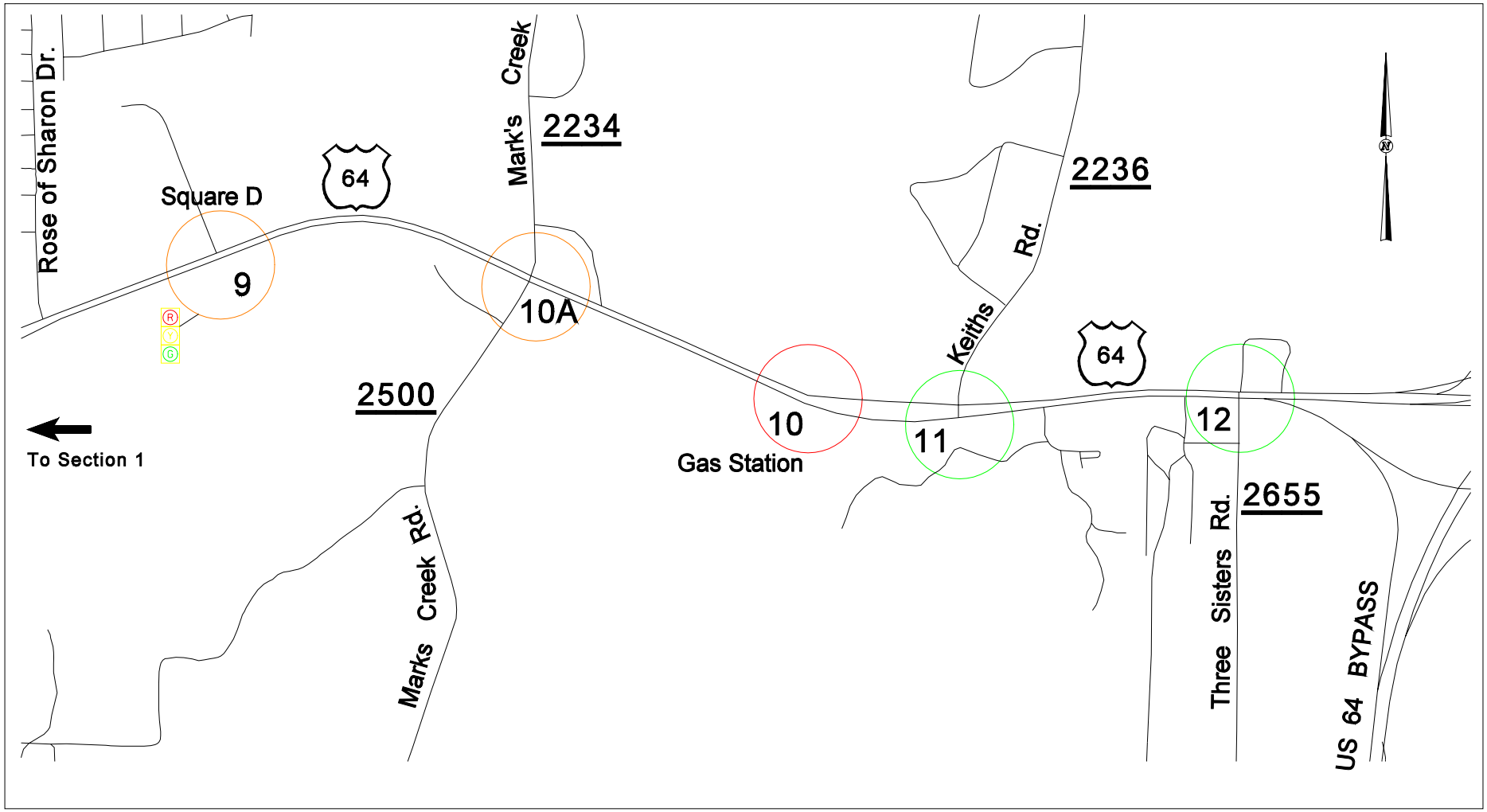
Location 3, 5, 6, 7: Turn Lanes Added

Location 1, 8: Improvements Deleted from this Project
(Constructed under another project.)

Non-Treatment Full Movement Crossovers Affected by Treatment

Signalized Intersections

Location Map for Hazard Elimination Project W-2937 (Section2)



Location 10: Crossover Closed

Location 9, 10A: Improvements Deleted from this Project (Constructed under another project.)

Location 11, 12: Turn Lanes Added

Signalized Intersections

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Location 1. The signalized intersection with Rogers Road is visible above.

Driving eastbound at Location 2.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Location 3.

Driving westbound at Westover Drive.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Hodge Road.

Driving westbound at Hodge Road.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Location 5.

Driving westbound at Location 5.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Widewaters Commons.

Driving westbound at Widewaters Commons. Location 6 is located to the west of this intersection.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Location 7.

Driving westbound at Location 7.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Location 8.

Treatment Site Photos (Taken on February 21, 2006)

Driving westbound at Location 9.

Driving westbound at Location 10A.

Treatment Site Photos (Taken on February 21, 2006)

Driving eastbound at Location 10.

Driving eastbound at Location 11.

Treatment Site Photos (Taken on February 21, 2006)

Driving westbound at Location 11.

Driving eastbound at Location 12.

Treatment Site Photos (Taken on February 21, 2006)

Driving westbound at Location 12.